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# ABSTRACTS OF TUBERCULOSIS

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**Death from Air Embolism after Haemoptysis.**—In an interesting case of extensive bilateral cavernous pulmonary tuberculosis death followed a profuse pulmonary haemorrhage. The patient had expectorated a large blood clot, 3 by 6 cm. in size, and of the appearance and consistency of spleen. Death occurred not from suffocation but from cerebral air embolism resulting from aspiration of air into the eroded vessel after the discharge of the clot.—*Kavernenblutung und Aushusten eines grossen, derben Blutgerinnsels; Tod durch Luft-Embolie, Hochstetter, Beitr. z. Klin. d. Tuberk., 1930, lxxiii, 835.*—(*H. J. C.*)

**Reactions Following Inoculation with Dead Tubercle Bacilli.**—It is now known that animals react differently when inoculated by various routes with the same suspension of bacterial products or whole cells. In conjunction with Petroff and Jennings the author has recently shown that when heat-killed tubercle bacilli are injected into guinea pigs, either intramuscularly or directly into the blood-stream, the animals fail to develop skin allergy, whereas inoculation by other routes results in a rapid and persistent hypersensitiveness of the skin to Old Tuberculin. A further elucidation of the problem is attempted and reported in the present article with the guinea pig as the experimental animal and human tubercle bacilli as the bacterial antigen. The heat-killed organisms used were prepared by immersing sealed tubes containing suspension of living bacilli for twenty minutes in a boiling water-bath. The presence of allergy was tested for in three ways: (1) by injection of 5 per cent Old Tuberculin intracutaneously; (2) by injection of 10 per cent Old Tuberculin intratesticularly; (Long's test); and (3) by Pfeiffer's interperitoneal phenomenon after inoculation with living or dead bacilli. The following results were obtained in one series of experiments: Heat-killed virulent tubercle bacilli, when injected in sufficient dosage and concentration intraperitoneally, intrapleurally, intratesticularly, or subcutaneously into the guinea pig, set up a state of allergy. The most rapid and intense allergic reactions follow intratesticular inoculation; the least constant and slightest reactions follow subcutaneous inoculation. On the other hand, a guinea pig inoculated intracardially and intravenously fails to develop signs of allergy and large doses in high concentration injected intramuscularly produce only a slight allergic response. Allergy may develop within fifteen days of inoculation of heat-killed tubercle bacilli in the peritoneum or pleura, but animals did not show anaphylaxis until at least three weeks after the inoculations. It is therefore assumed that tuberculous allergy and anaphylaxis are not directly related. The fate of inoculated dead

bacilli was studied. The only histological difference that could be demonstrated between intraperitoneal and intrapleural inoculation, on the one hand, and intracardiac and intramuscular, on the other, was the lack of caseation and extensive polymorphonuclear infiltration when the latter method was employed. After intravenous inoculation small tubercles form which are apparently absorbed in one month. The noncaseous tubercles resulting after intramuscular inoculation may persist as long as six months. The cellular response to virulent reinfection of animals vaccinated by various routes with dead bacilli was studied. The nonallergic, intramuscularly vaccinated animal was found to react to an inoculation in the pleura with living virulent tubercle bacilli like the allergic, intraperitoneally inoculated animal, with a rise in lymphocytes following the primary reaction. In the normal nonallergic animal the primary reaction is followed by an exudate predominantly of monocytes. An experiment was done to compare the immunity to reinfection of guinea pigs inoculated with heat-killed tubercle bacilli by various routes. In one group in which the animals received dead bacilli, some by way of the testicle and others intramuscularly, the infecting dose was one million living organisms by intracardiac inoculation. In another group the dead bacilli were given intraperitoneally to some, intracardially to the others, and the subsequent infecting dose was approximately 1,000 living organisms, inoculated intracutaneosuly. Both groups were adequately controlled. In the first group both the intramuscularly and the intratesticularly vaccinated animals showed a definite immunity, especially in view of the large dose given directly into the bloodstream. In every instance, in the intramuscularly vaccinated animals, tubercles due to the original inoculation of heat-killed organisms were found in the muscles at the time of the autopsy. In the second group, animals vaccinated intraperitoneally showed a definite resistance to infection. Many of the animals in the group vaccinated intracardially died of secondary infection too early to be included in the experiment. The few remaining animals did not appear to show any resistance to infection with virulent organisms. Perhaps this was due to the fact that the foci of reaction following intracardiac vaccination disappear too rapidly. It is pertinent to ask whether it would not be beneficial to inoculate individuals with heat-killed organisms for prophylaxis preferably by way of the muscle with resulting immunity and not allergy, since, on its face value the allergic response may often defeat its purpose, and death may occur in allergic animals before it occurs in the control similarly inoculated owing to the intense reaction induced in such organs as the peritoneum, pleura and lungs. *Conclusions:* Allergy and anaphylaxis in tuberculosis are independent phenomena, and immunity may be present without allergy. Intramuscular inoculation with heat-killed tubercle bacilli (and probably also intravascular inoculation) produces immunity and anaphylaxis *without* allergy, whereas intraperitoneal and intrapleural inoculation produces allergy, anaphylaxis and immunity. The development of allergy appears to be interrelated with the process of caseation. The practicability of prophylactic immunization of children by intramuscular inoculation with heat-killed virulent bacilli is suggested, the advantage being that if immunity can be obtained without allergy the valuable tuberculin skin test, if later positive, is evidence of infection and not the result of vaccination.—*Tuberculosis, I. Allergic, Anaphylactic and Immune Reactions in Guinea Pigs Following Inoculation with Heat-Killed Tubercle Bacilli, A. Branch and J. R. Cuff, J. Infect. Dis., August, 1930, xlvii, 151.*—*(J. S. W.)*

**Cultivation of Tuberculous Granuloma in Vitro.**—Small fragments of a tuberculous mass arising from the spinous process of a dorsal vertebra were cultured in the serum of the patient. After twenty-four hours endothelial cells migrated out freely from the original fragment, forming an irregular network around it. The cultures were refed with the serum every four to five days. The migrating cells were (1) lymphocytes, which disappeared after a week's cultivation, (2) endothelial ("epithelioid") cells and (3) fibroblasts. The chief interest attached to the endothelial cells. Some of these divided after their emigration; others, which could be individually recognized, survived without division during the whole month. Of the latter several gradually enlarged and their nuclei divided, probably amitotically, so that five or six nuclei coexisted in a single cell. These cells resembled giant cells which occur *in corpore* and, as in them, the nuclei tended to locate themselves at the periphery of the cytoplasm. In certain instances some of the nuclei migrated out from the giant cells with some attending cytoplasm but remained attached to the parent cell by fine strands, giving very much the appearance familiar in microscopical sections of a miliary tubercle. The observed facts suggest that in the formation of a miliary tubercle, a single endothelial cell transforms itself as above described into a giant cell. This throws off from its

circumference an encircling and adherent group of separate mononuclear endothelial cells. Lymphocytes, which are probably protective in purpose, accumulate from the blood-stream, completing the characteristic picture.—*Cultivation of a Tuberculous Granuloma in Vitro, T. Lumsden, Lancet, July 19, 1930, ccxix, 136.*—(*F. G. P.*)

**Azygos Lobe.**—Anomalies of the character of the fissures or in the number of the lobes in the lung caused by faulty branching of the bronchial tree are common. The anomaly due to an abnormal position of the azygos vein is more rare. In these cases the azygos vein is situated more laterally than normal, and to reach the superior vena cava makes a large curve which cuts deeply into the right superior lobe. There is thus marked off an accessory lobe, accurately termed the "accessory lobe of the azygos vein." As the vein sinks into the substance of the lung it carries a double fold of pleura. This four-fold septum shows on the X-ray as a thin line running from the apex downward and inward toward the 2nd costal cartilage, with a convexity outward and a very small dense pea-like shadow at the lower end. The latter is due to the vein. It may be mistaken for a hilar node or a node resulting from fibrosed infiltration.—*Accessory Lobe of the Azygos Vein, G. G. Kayne, Lancet, December 6, 1930, ccxix. 1231.*—(*R. D.*)

**Azygos Lobe.**—The accessory pulmonary lobe which sometimes occurs at the apex of the right lung is separated from the remainder of the apex by a fissure containing the vena azygos major. The position of the fissure and the size of the lobe depend on the degree of lateral deviation of the vein. The growing lung buds and cardinal veins are two variable factors in the development of this condition. The septum, by X-ray, appears as a fine, linear shadow descending from the medial side of the right apex, with the convexity to the right. The only pathological condition noted in this lobe is due to obstruction of the bronchus by the vena azygos. The incidence of the abnormality is approximately one per one thousand of the population. It is more frequent in males than females.—*The Accessory Lobe of the Azygos Vein, H. P. Nelson and G. Simon, Brit. M. J., January 3, 1931, no. 3652, 9.*—(*M. E. P.*)

**Pulmonary Hypoventilation.**—Evidence is presented that a marked degree of pulmonary hypoventilation exists for a variable period of time after abdominal operations. Thoracic volume is decreased and expansion of the lower lobes is prevented by a high position of the diaphragm. A restriction of the diaphragmatic excursions contributes to the faulty aeration of basal portions of the lung. The opening of the abdominal cavity and the entrance of air permit the negative intrapleural pressure to draw the diaphragm higher in the thorax. Besides this mechanical factor, a reflex splinting of the abdominal musculature because of pain is also important in effecting the altered status of diaphragmatic activity after operation. Rational postoperative treatment should include all measures that tend to overcome the faulty ventilation of the pulmonary tissue. Pain should be controlled by the adequate administration of morphine. Whether or not the postoperative patient with a poorly ventilated lung develops pneumonia depends on the presence of an infectious agent. The administration of carbon dioxide is the most effective method of increasing pulmonary ventilation. The authors suggest a postoperative procedure that may overcome or shorten the duration of the mechanical disturbance of diaphragmatic activity following abdominal operations. They attempt to force the diaphragm to a lower position and to re-expand basal portions of the lung, by having the anaesthetist give carbon-dioxide inhalations under positive pressure as the abdomen is closed. Air in the abdominal cavity is displaced by a physiological solution of sodium chloride, and this is removed by suction when the peritoneum is finally closed. If bronchial secretions are abundant, the foot of the bed should be raised at intervals to promote natural bronchial drainage. The routine use of the oxygen chamber after abdominal operations has proved unnecessary.—*Postoperative Pulmonary Hypoventilation, R. H. Overholt, J. Am. M. Ass., November 15, 1930, xcv, 1484.*—(*G. L. L.*)

**Internal Drainage of Lung.**—The term "internal drainage" is used to designate the spilling of pus from a diseased bronchus to neighboring bronchi of either lung. Internal drainage is a definite entity, and an understanding of this is important in both the diagnosis and treatment of pulmonary suppurations as well as in the prevention of postoperative pulmonary complications. Intrabronchial injections of iodized oil have permitted a study of internal drainage and of the factors on which it depends. Pus within a bronchus may spill to predetermined areas, depending on the posture of the patient, the site of the primary pulmonary lesion and the patency of the bronchus. This drainage is especially marked when the

pus is of low viscosity and of great quantity. If a chest operation is to be done, and there is a history of large amounts of expectoration, a bronchoscopic examination should be done immediately before operation so as to empty the bronchi and to prevent spilling from one lung to the other. The treatment should be repeated at the end of the operation if necessary. Special attention should be given to the position of the patient, not only on the operating table but also after his return to the ward. This will minimize the possibilities of sudden or latent secondary pulmonary complications. In cauterizing the lung, haemostasis should be as nearly perfect as possible. The author believes that many of the deaths ascribed to postoperative shock, cardiac failure, acute pulmonary oedema, pulmonary embolism and cerebral embolism are really the consequences of internal drainage.—*Internal Drainage: Its Application in Pulmonary Suppuration, W. B. Faulkner, J. Am. M. Ass., November 1, 1930, xcv, 1325.*—(*G. L. L.*)

**Protective Power of Pleura.**—The pleura and peritoneum are anatomically and physiologically related. Both act as protective coverings of their respective organs. Normally the pleura and peritoneum prevent friction by keeping in a state of lubrication the organs that they cover. Under pathological conditions they tend to wall off any underlying infection by the production of adhesions. The pleura is water-tight and air-tight. It protects the lung from overdistention. Normally it prevents fluids from going from lung to pleura and *vice versa*. Air is not allowed to escape from lung to pleura except when the pleura is injured. An intrapulmonic air pressure of over 60 mm. Hg. will cause a separation of the pleura from the lung and result in an air bulla. Pleural effusion associated with pneumonia or influenza may be regarded in the same light as peritonitis following gastrointestinal inflammation. There is a tendency on the part of the pleura to localize a lesion or protect the rest of the lung by the production of adhesions.—*The Protective Power of the Pleura, M. Joannides, Am. J. M. Sc., December, 1930, clxxx, 833.*—(*W. I. W.*)

**Relation between Pulmonary Disease and Cardiac and Vascular Function.**—The author examined cases with pulmonary disease, both tuberculous and nontuberculous, to determine the condition of the heart and vascular system. The heart function was tested by the method of Schrumpf and Adler, which consisted in measuring of the blood-pressure before and after a definite amount of work (knee-bending). Normally the pressure would increase from 20 to 40 mm. Hg., and with return to its original level within two minutes. In pathological cases two types of reaction occurred; either the pressure diminishes below that of the original value and then increased to the original value and above, or there was no increase but merely a decrease below the original value. To determine the vascular-system function the method of Kauffmann was used. If a person in the horizontal position is given at 6-hour intervals 150 cc. of water by mouth, and then, after the fourth or fifth drink of water the legs are elevated and the urine is evacuated every hour, the amount of urine increases in those diseased, while in normals there is only a slight or no change. As a whole 150 patients were examined and in 65.3 per cent the Adler-Schrumpf and Kauffmann test concurred as to findings. In the cases with divergent results there were 82 per cent with an abnormal Adler-Schrumpf but satisfactory or normal Kauffmann test. Of those examined 23 had nonspecific pulmonary disease, and among these there was a disturbance in the circulation of 60.8 per cent, and especially in whose in which the pulmonary disease had been of some duration. Among the patients there were 64.3 per cent with closed and 86.2 per cent with open tuberculosis that did not show any cardiovascular change—*Beziehungen zwischen Lungenerkrankungen (besonders Tuberkulose) und Funktionstüchtigkeit des Herz- und Gefässsystems, H. Poepping, Beitr. z. Klin. d. Tuberk., 1930, lxxiii, 409.*—(*H. J. C.*)

**Local and Peripheral Blood Pictures in Tuberculosis.**—The behavior of the peripheral and local blood picture was studied in first-infected and allergic superinfected rabbits. The "local" blood picture is a differential count in the vicinity of the disease focus; in these experiments the author used the cornea of the animal, and varying doses of strains of different virulence were used for infecting. A comparison of the peripheral and the local blood picture showed no decided differences; both revealed in the primarily affected animal a shift to the left while in the superinfected animal there was a lymphocytic reaction. The mononuclear cells are viewed as only in small percentage being of lymphocytic origin, the majority being of histiogenic or vasogenic source.—*Über Korrelationen von tuberkulösem Infektionsherd und Blutbild und über das "lokale Blutbild," E. A. Schneider, Beitr. z. Klin. d. Tuberk., 1930, lxxiii, 289.*—(*H. J. C.*)

**Variability of Acid-Fast Bacteria.**—Kedrowsky, going over his own work in this field a number of years ago, finds his then incompleted observations confirmed by two recent monographs, representing almost revolutionary conceptions of the microbiology of tuberculosis, those of Ferran and Vaudremer, both of whom have carried on their work for many years. Both authors lead from or toward the same idea: the ubiquity of tuberculosis cannot be completely explained by the existence of a single, classical form of causative agent, the acid-fast tubercle bacillus, which only exists parasitically in a high temperature and in nutritive media rich in fat and protein. In addition to this form there must be recognized another, saprophytic and able to subsist under conditions very different from those in living organisms. Vaudremer's methods of work follow more closely those of customary laboratory technique, working step by step methodically to new positions leading finally to the details of a great conception; Ferran is more of the artist, having a powerful imagination, given to speculative construction of schemes and conceptions. He indicates by "gamma" the classical form of tubercle bacillus, which by "mutation" may pass into the "delta" type, distinguished by homogeneous growth, attenuated acid-fastness and diminished virulence. Further mutation may result in the "epsilon" type, almost avirulent, and in form resembling colon bacilli. This form is widely distributed. Ferran finds it in the dejecta of the vagabond dogs of Barcelona, the envelopes of sausages, in chronic vaginal flux, in old tuberculous cows' lungs, etc. The author has almost identified it with the bacilli causing so called "pseudotuberculosis" in guinea pigs (*B. pseudotuberculosis rodentium*), progenitor, according to him, of *B. coli*. This almost saprophytic form is termed the "alpha" type. On inoculation into guinea pigs it provokes only "visceral inflammation," causing rapid death, but this may be followed by a specific process, with formation of a few tubercles, thus transforming itself into a more virulent, parasitic, form ("beta"). Repeated animal passage restores all the original characteristics of "true" tubercle bacilli. Vaudremer directed his observations in three directions: *1:* Tubercle bacilli grown on glycerine-broth were replanted on media of feeble nutritive value, poor in fat and protein (especially potato-broth, without glycerine). The resulting growth is quite polymorphous, sometimes resembling little rods or cocci, sometimes small granules, sometimes long, branching and curved. They color well with Gram's stain but their acid-fastness is weak or lost. Replanted on nutritive media rich in glycerine they soon reëstablish the original and classical type. *2:* Tubercle bacilli were planted on Raulin's medium on which a mould (*Aspergillus fumigatus*) had grown some time and which was then filtered through bougie L3. Growth appeared after a few days in the form of coccoid gram-positive elements, Ziehl negative. Replanted on 5 per cent glycerinated potato-serum they again were transmuted into acid-fast bacilli. *3:* A study of the microscopic flora of the pus from tuberculous cold abscesses showed a very few tubercle bacilli and many coccoid and granular forms, similar to those just noted. Planting this pus on the media of Dorset, Petroff, etc., resulted in metamorphosis into granules and acid-fast bacilli. The granules varied in size down to the smallest visible fragments. Vaudremer and Durand tried to pass this pus through a bougie filter. After such passage, injection of the filtrate into guinea pigs set up a lymphadenitis and arthritis, and from the broken down lymph nodes could be recovered the same nonacid-fast granules which, however, when planted on Dorset's or Petroff's media became transformed into acid-fast bacilli, confirming the work of Fontes in 1910. Identical results were obtained by filtering cultures rich in the so called "involution forms" of Metchnikoff. Vaudremer concluded that the same granule found both in tuberculous matter and in cultures, in varied form, is an essential element of the tuberculous virus. In its development it may assume a coccoid form, or finally a complex branching formation, like the moulds. Depending on the media these forms may be either acid-fast or cyanophile (nonacid-fast). Russian literature, in particular, abounds in work indicating a variable morphology and biochemistry of the tuberculous virus. The unfinished work of Kleptzov and Kumbari is cited. The latter, by using a specially prepared medium containing 3 per cent alcohol, strongly alkalinized by ammonia, has been able to deprive tubercle-bacillus cultures of all acid-fastness. He has done this successfully 27 times in a few years but has been unable to restore to the culture its original properties; neither has he succeeded in doing so by animal inoculation. Kedrowsky then cites his own personal observations, made twenty years ago in leprosy. Having isolated from leprous nodules a nonacid-fast diphtheroid organism, he inoculated it into a rabbit's brain through a trephine opening in the skull and after a year and a half found, in the spinal meninges, granulomatous nodules composed of epithelioid cells, which contained an enormous number of acid-fast bacilli in pure culture. Some

months later the experiment was repeated, with the same results, after a period of but four months. Beside the acid-fast organisms, however, there were isolated from the viscera of the animals diphtheroid nonacid-fast organisms, which it was possible, by infection of other animals (rabbits and mice) to transform into an acid-fast variety. It was quite natural to try to confirm these results with an organism which had been more carefully studied morphologically and biologically (the organism of tuberculosis) and this work has been carried on since 1922. *Experimental Technique:* Tuberculous cultures of three types (human, bovine and avian) were planted on nutritive media of different sorts and varying freshness. For the inoculations both young cultures and old attenuated ones were used. The time of the first appearance of a growth varied considerably: sometimes it was rapid and typical, sometimes very slow, appearing only after several months. Some of these growths presented a "denatured" appearance,—dry and scaly instead of humid and fatty. Slowly developing cultures showed especially an orange or yellow pigmentation, sometimes with shades of rose. So called "paratuberculous" organisms under similar conditions also changed or lost color, as did also actinomyces. Microscopic examination showed a great variety of forms, sometimes typical or normal, sometimes short and thick, sometimes long and filamentous, sometimes horned or branching, sometimes homogeneous, sometimes granular, the granules also varying in size and coloration. It is the atypical cultures which are of special interest. Planting a typical culture on ordinary potato media results ordinarily in a fairly rapid homogeneous development, usually of a pale yellowish-brown color. Microscopically one finds acid-fast and nonacid-fast forms in about equal numbers. Replanting on glycerinated potato, or Wassermann's medium, the acid-fast quality rapidly diminishes and finally disappears. Rapid homogenization is still more rapidly accomplished on Kumbari's medium. In from five to ten days the "red" and "blue" bacilli are about equal in numbers, and these mixed cultures can be preserved or separated at will. A very good picture of the development and growth of a tuberculous culture may be obtained on an ordinary carrot (or one treated with Kumbari's liquid), especially if both the carrot and the culture are old. Growth then takes place very slowly and presents the appearance of a wrinkled membrane, showing curious folds and covering the surface, or of spherical rolls around islands of the transplanted culture, their surfaces embossed with strange designs. Microscopically, among the "red" and "blue" bacilli are star-shaped mycelioid masses, like those described by Arloing and Dufourt, Stockwell and Togounova. These are composed of ramifying and interlacing filaments, which may stain red, blue or violet. Replanting of these cultures yielded quite unexpected results: sometimes long ramifying filamentous forms, resembling streptothrix; sometimes a pure culture of ordinary aspect, in isolated colonies, or sometimes at first a typical culture which later developed filaments; sometimes mixed or symbiotic colonies. The following explanation is proposed: The tuberculous or leprous virus or organism under unfavorable conditions becomes weakened and degenerates, losing both acid-fastness and virulence; but, when this degradation has progressed to a certain point, nature intervenes to conserve its vitality. Hence the surprising mutations encountered. The most vulnerable point concerns the transformation of bacillary into filamentous forms. This is, however, confirmed by the work of others such as Vaudremer, and Bezançon and Philibert, Arloing and Dufourt, and Stockwell. What brings about the inverse transformations? One conclusion only is reached: Renewed interest has been aroused in the question of tuberculous infection and twenty or thirty years more should see a solution comparable to that of other infectious diseases.—*Variabilité des microbes du groupe acido-résistant, W. I. Kedrowsky, Rev. d. l. Tuberc., October, 1930, xi, 893.*—(*A. P.*)

**Types of Tubercle Bacilli.**—This study deals with the identification of the types of tubercle bacilli isolated from the latent lesions and nontuberculous tissue previously reported on and from active lesions of the lungs, lymph nodes and spleen. From 302 autopsies, 711 different specimens were studied for the presence of tubercle bacilli. Guinea pigs were inoculated and were killed when they presented definite evidence of tuberculosis. The spleen and the iliac and inguinal nodes were minced into fine bits and were then rubbed on the surface of a number of tubes of Dorset's medium, and in a number of instances were also inoculated on Petroff's medium. Pure cultures of tubercle bacilli were isolated from 227 of these specimens, representing 131 autopsies. Guinea pigs inoculated from 418 of the specimens proved to be negative for tubercle bacilli, and those inoculated from the remaining 66 died in less than twenty days from sepsis or other intercurrent disease. Of the 227 specimens from which tubercle bacilli were recovered 88 were derived from tissue containing latent tuberculous lesions, 99 from

tissue containing progressive tuberculous lesions, and 40 from tissue, free from tuberculous lesion. Guinea pigs inoculated with suspensions of 12 different tuberculous lesions in which acid-fast bacilli were seen microscopically failed to develop tuberculosis. Variations in the susceptibility of the individual guinea pig to tuberculous infection, in the degree of virulence and in the number of tubercle bacilli injected, may be factors that modify the results following inoculations with suspensions of tuberculous tissue. In 25 instances but 1 of 2 guinea pigs inoculated with the same amount of the same tissue suspension developed both local and generalized tuberculosis. In 18 of these cases the tissue suspension originated from tissue containing latent tuberculous lesions, in 5 from lung tissue free from tuberculous lesions, and in 2 from tissue containing progressive tuberculous lesions. In a group of 11 instances there occurred 1 of 2 guinea pigs having a generalized tuberculosis without any gross tuberculous lesion at the site of injection and with no involvement of the inguinal lymph nodes; there was no evidence of tuberculosis in the other guinea pig. The possibility of air-borne infection cannot be excluded in those guinea pigs in which generalized tuberculosis was observed without a tuberculous ulcer at the site of injection. These animals had been kept for some time in a room where numerous tuberculous animals were quartered. To minimize the danger of room infection the time of observation was reduced from six months to ninety days and later to sixty days. The cultural characteristics of the 227 strains of tubercle bacilli isolated from the positive guinea pig were studied. It was found that the difference in the degree of growth on Dorset's medium was not sufficiently constant to warrant its use for differentiation. When, however, the cultures were transplanted to 3 per cent glycerol-agar, it was found that they fell into two distinct groups, one which showed a moderate or luxuriant growth and the other, slight growth. All but 5 of the 217 strains that on subsequent examination proved to be of the human type fell into the first group. In contrast to the growth of the first group of tubercle bacilli was the slight and at times almost imperceptible growth of the second group, which subsequently proved to be of the bovine type. The morphological characteristics of the human and bovine tubercle bacilli were compared in smears prepared from the different cultures. It was found that in cultures the human tubercle bacillus may vary in length from less than 1 to 6 micra. They may be short and thick and stain uniformly, or they may be long, thin, and slightly curved, with pale-staining protoplasm and metachromatic granules either polar or scattered throughout the protoplasm. In smears made from cultures of the bovine type the microörganisms on the whole were shorter and thicker, and they stained uniformly. Bacilli were frequently noted, however, that resembled morphologically those seen in the smears from the human type. The pathogenicity of the cultures for rabbits was also studied. One hundredth of a milligram of a culture was injected intravenously. Eighty-three of the cultures from the latent tuberculous lesions proved to be of the human type and three of the bovine type. Ninety-six of the cultures from the progressive lesions were of the human type, and three of the bovine type. Thirty-eight cultures from lung tissue, pulmonary lymph nodes and mesenteric lymph nodes free from tuberculous lesions proved to be of the human type and two were atypical. The reaction curve in glycerol-broth of 216 strains of tubercle bacilli was also studied. The reaction of 149 cultures was obtained by titration with phenolphthalein as an indicator, and by determining the hydrogen-ion concentration colorimetrically, as described by Brown. The results obtained by the two procedures paralleled each other so closely that the reaction of the remaining 67 strains was determined by the second method alone. Of the human strains, 154 cultures gave the human type of reaction curve and 52 cultures gave the bovine type. The six bovine and the four atypical strains gave a bovine type of reaction curve. The specificity of 214 of the cultures was studied by the complement-fixation reaction. The results showed that the antigenic property bore no relationship to the type of culture, whether human or bovine, to the origin of the culture or to the cultural or biological characteristics. *Summary:* Tubercle bacilli obtained from latent and progressive lesions and from nontuberculous tissue fall into two distinct groups with occasional atypical strains. The human type of tubercle bacillus is characterized by luxuriant growth on glycerol-agar and slight pathogenicity for the rabbit. The bovine type of tubercle bacillus is characterized by sparse growth in early generations on glycerol-agar and high pathogenicity for the rabbit. The atypical strains may grow luxuriantly on glycerol-agar and be highly pathogenic for the rabbit or the cultures may grow sparsely and be slightly pathogenic for the rabbit. The glycerol reaction curve was not found to be specific for the respective types. No difference between the types could be detected by means of the complement-fixation reaction. From latent tuberculous lesions of human autopsy material there were isolated 83

cultures of the human type of tubercle bacillus, 3 cultures of the bovine type and 2 atypical strains. From progressive lesions 96 cultures of the human type and 3 cultures of the bovine type were isolated. From lung tissue, pulmonary lymph nodes and mesenteric lymph nodes free from tuberculous lesions, there were isolated 38 cultures of the human type and 2 atypical cultures. Three of the bovine cultures were obtained from guinea pigs inoculated with latent tuberculous lesions from patients aged 42, 62 and 65 years. Three cultures of bovine tubercle bacilli were obtained from the mesenteric nodes of children, aged 10 and 12 months, and from the lung of the second child. The atypical strains of tubercle bacilli were isolated from 2 patients, aged 57 and 70 years. Two of these cultures were obtained from nontuberculous lesions and 2 from a latent tuberculous lesion.—*The Types of Tubercle Bacilli Found in Tuberculous Lesions and in Nontuberculous Tissue in Man, J. D. Aronson, J. Infect. Dis., July, 1930, xlvii, 30.*—(*F. G. P.*)

**Egg-Yolk-Agar Medium for Tubercle Bacilli.**—This medium is prepared as follows: The yolk of one egg is added to 150 cc. of melted beef-extract-agar (reaction pH 7.5) at a temperature of 60°C. The agar is cooled to 40°C., and 25 cc. is poured into each petri dish. The incubator should be kept moist to prevent drying of the plate. Tubercle bacilli from catheterized urine showed visible colonies in ten days and reached their maximum growth in about sixteen days. The color of this medium tends to obscure the early growth, but smears can be made when in doubt. Dilution experiments show that the culture method is equal to guinea-pig inoculation for demonstrating tubercle bacilli and superior to the smear method. Acids may be incorporated in the medium to prevent the growth of other bacteria, but this would seem unnecessary in most instances, even with tuberculous sputa if the same care is used in collecting specimens as in the case of pneumonic sputa. If a small selected portion of the sputum is washed in sterile physiological saline solution before inoculation, the presence of secondary organisms does not hinder a diagnosis of the tubercle bacillus in mixed cultures on plates. The addition of hydrochloric acid to the melted egg-yolk-agar to make a dilution of 1:1000, prevented the growth of staphylococci, streptococci and approximately 50 per cent of the colon bacilli. The growth of tubercle bacilli was delayed about forty-eight hours, but their maximum growth in fourteen days was approximately the same as that on the control plate. Sulphuric acid, in a dilution of 1:200, proved unsuitable, preventing the coagulation of the medium when cooled. Oxalic and citric acids were also added to the medium to make a dilution of 1:200. There was a moderate growth of staphylococci on the citric-acid plate. There was no growth of any of the bacteria on the oxalic-acid plate. The acid medium gave distinct inhibition in the time of appearance and the number of colonies of tubercle bacilli as compared with the nonacid medium. Further work is necessary to determine the practical value of this method. Comparison was made of plates with two strains of human tubercle bacilli, of *BCG*, gonococci, and staphylococci on egg-yolk-agar, egg-white-agar and whole-egg-agar. The human strains of tubercle bacilli grew profusely on egg-yolk-agar, slightly less on the whole-egg-agar and not at all on the egg-white-agar. Gonococci grew well on the egg-yolk and whole-egg-agar, but there was no growth on the egg-white-agar. The *BCG* strain grew more sparsely on the egg-yolk-agar and the whole-egg-agar with no growth on the egg-white-agar. Staphylococci grew sparsely on egg-white-agar, profusely on egg-yolk-agar and slightly less on whole-egg-agar. These experiments seem to show that egg-white may be bacteriostatic, and that whole egg serves as a satisfactory enricher of medium mainly because of the yolk. It is apparently of great importance that the amount of agar should not be greater than one per cent, also that the atmosphere be moist and the temperature range between 34° and 36°C. Recently subcultures of tubercle bacilli were made on 1 per cent phosphate-agar to which 15 per cent of defibrinated sheep-blood was added at 68° to 70°C., and gradually cooled to 40°C. before being poured into plates. A shiny confluent growth of tubercle bacilli appeared in from three to four days. Continued transplantation on the blood medium gave more delayed growth. A comparative evaluation of this blood-agar with egg-yolk-agar for initial isolation has not been made as yet. *Summary:* The use of egg-yolk in nutrient agar simplifies the cultivation of *B. tuberculosis* as well as other bacteria that ordinarily require highly nutrient media. It can be used for both plates and plants. Comparative tests indicate that this method is much more certain than smears and not only as delicate as, but also much more prompt than the inoculation of guinea pigs. Initial cultures from a variety of infected exudates demonstrated that its value in clinical diagnosis is greater than that of smears. A moist atmosphere and a temperature ranging between 34° and 36°C. are essential for optimum growth of tubercle bacilli on the egg-yolk-agar described.—

*Egg Yolk Agar Medium for the Growth of Tubercle Bacilli, R. D. Herrold, J. Infect. Dis., February, 1931, xlviii, 236.—(F. G. P.)*

**Isolation of Tubercle Bacilli from Sputum.**—Hohn's method for the isolation of tubercle bacilli from contaminated sputum is the best available technique at the present time. The concentration of the acid for the homogenization of the sputum must be kept as low as possible. The addition of some potato flour to the medium advocated by Hohn is a definite improvement. It is important to prevent the dehydration of the media, for which purpose a test-tube with glass stopper has been devised by the author.—*Ein Beitrag zur bakteriologischen Diagnostik der Tuberkulose, J. Mouriz, Klin. Wchnschr., November 29, 1930, ix, 2249.—(M. P.)*

**Cultivation of Tubercle Bacilli.**—The author compared the Lubenau-Hohn egg medium with Petroff's gentian-violet-egg medium and the Petragnani potato-milk-egg-malachite-green medium for cultivating tubercle bacilli. The Lubenau-Hohn and Petroff's media proved equally efficient. The author advises the addition of 1:20,000 gentian violet to Petroff's egg medium in place of 1:10,000 as recommended. Petragnani's medium proved less suitable than the other two media tried and the bacilli appeared to be visible earlier in the Lubenau-Hohn while a greater percentage of growth was obtained on the Petroff medium.—*Die Kultur des Tuberkelbacillus. (Vergleichende Nährbodenuntersuchung.), M. Malkani, Beitr. z. Klin. d. Tuberk., 1930, lxxiii, 395.—(H. J. C.)*

**Cultivation of Tubercle Bacilli from Blood.**—Previous work has shown it possible to recover tubercle bacilli from the circulating blood by the use of 15 per cent sulphuric acid. The ordinary media, however, have not given very satisfactory results and the following medium is suggested: monopotassium phosphate, 0.4 per cent; magnesium sulphate, 0.04 per cent; magnesium citrate, 0.1 per cent; asparagin, 0.6 per cent; glycerine, 2 per cent. To 120 cc. of this solution, add 6 gm. powdered potato and set in water-bath for 2 hours. After cooling to 50°C., add 4 whole eggs and 10 cc. of a 2 per cent sterile solution of congo-red and filter through gauze. Tube and sterilize as in Loeffler's serum. The technique of culture is as follows: Collect 10 cc. of blood in 3 cc. of a 10 per cent sodium-citrate solution. Centrifugate aseptically. Pour off the plasma. Dissolve the blood corpuscles with sterile acetic acid and centrifugate again. This removes the haemoglobin which inhibits growth. Treat the sediment with 15 per cent sulphuric-acid solution for 5 minutes, then add sterile distilled water and centrifugate a third time. After one washing to remove the sulphuric acid, inoculate the entire sediment into the tubes. By this means rapid growth of tubercle bacilli (occasionally macroscopic growth in 12 days) was obtained. In 7 cases of afebrile renal tuberculosis with patients in good condition, 5 yielded positive blood cultures. All of 10 cases of cutaneous tuberculosis (3 with tuberculides) gave positive cultures. In far-advanced pulmonary tuberculosis of the miliary type, all cultures were positive. In moderately advanced pulmonary tuberculosis, 15 per cent of the cultures were positive, whereas in cases of minimal pulmonary tuberculosis all cases were negative. Cases of intestinal tuberculosis yielded positive results in 90 per cent.—*Die Methodik der Reinkultur von Tuberkelbazillen aus dem Blute, E. Löwenstein, Deutsche med. Wchnschr., June 13, 1930, lvi, 1010.—(H. S. W.)*

**Method for Detecting Sparsely Distributed Tubercle Bacilli.**—The solid material is mixed thoroughly with approximately 250 cc. of saline solution (from 1.5 to 2 per cent). Liquid specimens are made up to a concentration of from 1.5 to 2 per cent by means of chemically pure sodium chloride. The solution is allowed to stand over night in a narrow-necked 250-cc. Erlenmeyer flask. During the time that has elapsed, the tubercle bacilli rise to the surface. By successively touching all portions of the narrow surface with a 10-mm. platinum loop, the entire area may be covered. Each film is transferred to a glass slide, dried in air, fixed by heat and stained.—*A Method for Detecting Sparsely Distributed Tubercle Bacilli, J. Felsen, Arch. Path., July, 1930, x, 110.—(F. G. P.)*

**Tests for Pathogenicity of Tubercle Bacilli.**—The type determination of tubercle bacilli according to Oehlecker, in which 0.01 mgm. of bacilli is injected intravenously into rabbits, did not always give satisfying results in that low-virulent bovine strains gave irregular findings. Occasionally highly virulent human strains for the rabbit also made this test indecisive. The possibility of spontaneous infection by inhalation with bovine strains made the subcutaneous test appear preferable at times. The author recommends his so-called "four-cornered" method, with which it is even possible to test 2 to 4 different strains at the same time. This method resembles that of Lange and Lydtin in determining virulence in guinea

pigs. The tests were made intracutaneously and were given in four different regions near the extremities, the dosage being from 0.001 to 0.000001 mgm. With 0.001 mgm. there occurred an early reaction which was followed in the case of bovine strains with the development of a primary "Affect," while with 0.000001 mgm. this reaction was absent. In the case of four bovine strains thus tested there occurred regularly a primary "Affect" in the skin, while with three human strains this was lacking. With the bovine strain there also occurred frequently a caseation of the regional lymph nodes, this being present only once with the human strain. Dependence is placed upon the finding in the regional node. Hypertrophy of lymph nodes occurred between the 30th and 40th days, and the final evaluation is made upon section after three months. The identification of low-virulent bovine strains is not possible by this method.—*Vergleichende Prüfung der Pathogenität von Tuberkelbacillenstämmen am Kaninchen durch intracutane Verimpfung der zu prüfenden Stämme an ein und demselben Tier. I. Mitt. Unterscheidung des Typus bovinus und humanus, T. Toda, Zeitschr. f. Tuberk., 1930, lv, 302.*—(*H. J. C.*)

**Effect of Sputum Autolysates on Tubercle Bacilli.**—In autolyzing sputum layer-formation disappears within 24 hours and liquefaction occurs while the sediment disappears completely after 2 weeks. The formed elements disintegrate rapidly within 24 to 48 hours, while the concomitant bacteria increase up to 48 hours and then disappear after 8 to 9 days. Tubercle bacilli begin to diminish after 1 to 2 days, and during the course of their disintegration there occurs granule-formation, a weakening of the red staining, and finally there remains only small granules or particles. After 6 to 9 days there develop new types of bacilli with all transitions from granules to complete bacilli. The explosive and periodical appearance of the intermediate bodies is explained as due to a rapid disintegration of the bacilli. The filtrate of the autolysate after boiling has a marked inhibitory influence upon tubercle bacilli in culture. There is a definite loss of virulence in animal experiments in the nutrient medium to which has been added the filtrate. The details of this mechanism are being studied—*Studien über das Sputum-Autolysat. I. Mitt. Einfluss des Sputum-Autolysats auf Wachstum, Morphologie und Virulenz des Tuberkulose-erregers, A. Havas, Zeitschr. f. Tuberk., 1930, lvi, 39.*—(*H. J. C.*)

**Filterable Forms of Tubercle Bacilli.**—This paper is a brief review of the whole subject. Considering the fact that the existence of a filterable virus in tuberculosis is asserted by most competent workers and that it is denied by others not less competent, it is concluded that it would be premature to take a definite stand on the question. Further work is necessary. It should be seriously considered whether the traditional methods which have been employed in this work are suited for the solution of the problem. It should be realized that the problem of the filterable virus in tuberculosis is only a special case of the problem of life-cycles and metamorphosis of bacteria in general. It is quite possible that new techniques must be developed to settle the question.—*Ultravisible Formen des Tuberkelbacillus, K. W. Clauberg, Klin. Wchnschr., November 1, 1930, ix, 2041.*—(*M. P.*)

**Filterable Form of Tubercle Bacillus.**—A filterable virus has been obtained from purulent material, sputum, blood, urine, milk, serofibrinous pleural exudates and young cultures of tubercle bacilli. It can be demonstrated that virus from these substances passes through a filter and through the placenta. The virus localizes in lymphoid tissue where, as in cultures, it passes from the supposedly granular to the bacillary stage. The virus causes a hyperplasia of the lymphoid tissue but no true tubercles. However, the latter may be formed after several passages through animals. The virus does not appear to produce tuberculosis, but sensitizes animals against tuberculin. In the future it may be necessary to differentiate between lesions caused by the tubercle bacillus (bacillosis) and lesions caused by this ultravirus (prebacillary granulaemia). To the latter may be attributed the pleural, peritoneal, articular, meningeal and pericardial exudates.—*Das tuberculose Virus (präbazillaie Granulämie und Bazillose), A. Calmette, Deutsche med. Wchnschr., May 2, 1930, lvi, 733.*—(*H. S. W.*)

**Filterable Virus in Tuberculosis.**—Cultures of tubercle bacilli, excreta containing numerous bacilli, urine in cases of renal tuberculosis, tuberculous pus and extracts of tuberculous organs were examined microscopically for tubercle bacilli and, if found negative, were used for animal inoculation. To the material was then added *B. coli* or *pseudotubercle bacilli* and the mixture submitted to filtration. Cultures on Dorset's and Besredka's media in no case revealed the presence of a filterable virus. Inoculation of the filtrate subcutaneously and intraperitoneally also proved negative. In guinea pigs the test on the young from animals injected with tubercle bacilli in no case

proved the presence of a filterable virus or transplacentary infection.—*Untersuchungen über das Vorhandensein eines filtrierbaren Virus bei Tuberkulose, J. T. Leusden, Zeitschr. f. Tuberk., 1930, lv, 437.*—(*H. J. C.*)

**Immunity in Tuberculosis.**—Koch's phenomenon, as elaborated in its quantitative relations, showed that only an animal with far-advanced tuberculosis failed to develop progressive tuberculosis of the regional lymph nodes following reinfection, and only if the reinfecting dose is small. It was generally assumed that this phenomenon indicated immunity. But another concept, based on numerous experiments, seems to explain the condition better. A far-advanced tuberculous animal contains so many tubercle bacilli that an additional injection of small numbers of tubercle bacilli does not represent a noticeable stimulus. Experiments on preventive immunization have demonstrated the fact that the afforded protection increases with the virulence of the strain used for vaccination; in other words the "pseudo-immunity" is the better, the severer the primary disease. Everybody seems to agree on the opinion that immunity ceases with the disease. Reinfecting bacilli are not killed, but they are quickly taken up in the general circulation; hence the frequency with which tubercle bacilli can be isolated from the blood of patients. With his associates, the author examined 1600 specimens of blood with his recently published technique. Tubercle bacilli were found only in the blood of tuberculous patients, most frequently at the time of acute exacerbations. Based on bacteriological findings it is assumed as an established fact that acute polyarthritis is a bacteriaemic tuberculosis.—*Zur Frage der Tuberkulose-Immunität, E. Loewenstein, Wien. klin. Wchnschr., February 20, 1931, xliv, 256.*—(*M. P.*)

**Relation of Allergy to Immunity.**—Allergy has been regarded as intimately bound up with immunity. It has not, however, been proved that allergic hypersensitiveness with its extensive destruction of tissue in tuberculosis is really essential for the maintenance of acquired immunity If the tuberculous body can be spared the danger of untoward allergic accidents without interfering with the free play of immunity, the development of methods of desensitization might prove to be of great value in many cases of tuberculosis. Certain observations indicate that a high degree of acquired immunity can exist independently of allergic hypersensitiveness and, on the other hand, that a high degree of allergy may be present at a time when acquired immunity is greatly depressed. In the immune body the tubercle bacilli are prevented from living and proliferating as freely as they do in the normal one. Uninflamed sites in the body with acquired resistance may be as unfavorable to the growth of the bacilli as are the phagocytes. It is undeniable that allergic inflammation results in the death of tissue. It is a question whether it contributes to resistance. Using rabbits as experimental animals, an area of intense allergic reaction was produced by immunizing to pneumococci and then injecting pneumococcus antigen. Into this area an average of four fowl cholera bacilli were injected. A similar dosage was given to control animals. The latter died, while most of the test animals were protected. In another series of animals the allergic reaction was produced and coincidentally the fowl cholera bacilli were injected. In these animals the disease ran a more acute course than in the controls. The previously produced inflammation was protective; that which was coincident with the infection was not. Syphilis calls out primarily a mononuclear response, and the lesions are histologically comparable to those of tuberculosis. It seemed worth while to study the possibility of dissociating allergy and immunity in this disease. Rabbits were infected with strains of spirochaetes derived from human lesions, and at different periods after the inoculation measured doses of virulent spirochaetes were injected subcutaneously into these animals and into controls. The control animals developed chancres, while the other animals showed at no time the slightest reaction to the injection. Sections from the controls showed characteristic mononuclear inflammatory reaction and progression to ulceration. The areas of reinfection in the syphilitic animals showed slight early reactions with subsequent return to the normal state. The reaction in the reinfected animals was never at any time comparable to that in the controls. The tissue cells of these animals were indifferent to the presence of the virus. Cellular immunity was present without any detectable allergic reaction. It is of note that Branch has produced acquired immunity in tuberculosis in the complete absence of allergy by means of a special method of immunizing with dead tubercle bacilli.—*Observations on the Relation of Allergy to Immunity, A. R. Rich, Bull. Johns Hopkins Hosp., October, 1930, xlvii, 189.*—(*R. D.*)

**Artificial Immunization against Tuberculosis.**—In earlier experiments on artificial immunization in which tuberculous tissues were placed subcutaneously in bacterially impervious sacs (*Beitr. z. Klin. d. Tuberk.*, 1929, lxxi, 604) it was recommended that this

method be used for immunizing purposes. In order to determine whether these sacs are suitable for the production of antibodies sheep erythrocytes where placed in the sacs subcutaneously in rabbits and it was shown that the serum of these animals after a short time contained a fair titre of haemolysins.—*Experimentelle Beiträge zur künstlichen Immunisierung gegen Tuberkulose. III Mitt. Hämolysinversuche, P. Kallos and E. Bajzo, Beitr. z. Klin. d. Tuberk., 1930, lxxiii, 323.*—(*H. J. C.*)

**Immunization against Tuberculosis with Saponified Antigen.**—With the intention of first causing the disintegration of tubercle bacilli by means of lipases and then immunizing with the split-products of the tubercle bacillus, the author used a saponified antigen in guinea pigs for determining its immunizing properties. Old human cultures of tubercle bacilli were treated with 20 per cent sodium hydroxide *in vacuo* at 37° to 50°C. for one month to prepare the antigen, and it was found that animals infected and treated with the saponified antigen lived longer than controls, especially when 1:1,000 dilution was used, while with 1:10 and 1:100 dilutions the treated animals died earlier. Animals immunized with the saponified antigen in concentrations of 1:5000 up to 1:100,000 lived longer than controls. Under these circumstances there was widespread sclerosis of the liver, spleen, kidney and pancreas. In rabbits antisera were then produced, using fat and lipoid containing acetone-ether-chloroform extracts of tubercle bacilli, a protein-containing suspension in physiological salt solution of defatted tubercle bacilli, and the original saponified antigen. All of these sera prolonged the life of infected guinea pigs, but the first serum caused a more intensive cirrhosis while the third one retarded it. It is hoped that a combination of active immunization with the saponified antigen combined with a serotherapy will eventually give the best results.—*Immunisierungsversuche gegen Tuberkulose mit "verseiftem" Antigen, A. v. Jeney, Zeitschr. f. Tuberk., 1930, lv, 496.*—(*H. J. C.*)

**Tuberculin Reaction.**—In elaboration of observations made by others that certain substances possess the property of inhibiting or neutralizing the local tuberculin reaction, the authors used solutions of sodium morrhuate and sodium gynocardate, as well as solutions of calcium and manganese salts. After the amount of tuberculin producing a reaction in the patient had been determined these various reagents were added in different concentrations. Sodium morrhuate and sodium gynocardate caused a definite diminution in the reaction, while manganese chloride increased it and calcium chloride gave indefinite results. The action of sodium morrhuate and sodium gynocardate is to be explained as due to the antitryptic properties of the unsaturated lipoids, while with calcium chloride the possibility of an action through the nervous system cannot be excluded. On the basis of a parallelism between the local and general sensitiveness, it is reasoned that these experiments may point to a way of desensitizing lung tissue for therapeutic purposes.—*Studien über Tuberkulinreaktion, G. Platonoff and S. Schawrowa, Beitr. z. Klin. d. Tuberk., 1930, lxxiii, 435.*—(*H. J. C.*)

**Intracutaneous Tuberculin Reaction.**—A series of 108 cases of tuberculosis and 69 cases not clinically suffering with tuberculosis were examined by means of the intracutaneous tuberculin test, in order to ascertain its value as a prognostic test. Koch's Old Tuberculin was used. All patients showed a positive reaction with dilutions varying from 1 in 1,000 to 1 in 1,000,000. In the earlier stages of the disease and in the less severe infections, positive reactions could be obtained with greater dilutions of tuberculin. As the disease advances, the patient fails to react to the greater dilutions. A test which becomes more marked in reaction gives an indication that the lesion is improving and is of good prognostic value, whereas when a patient fails to react, the outlook is not hopeful.—*The Significance of the Quantitative Intradermal Tuberculin Reaction in the Prognosis of Tuberculosis, J. W. Loban, Tubercle, October, 1930, xii, 19.*—(*M. E. P.*)

**Pulmonary Focal Reactions.**—Injection of tuberculin may lead to an inflammation about a pulmonary focus of tuberculosis, which may be disclosed roentgenologically. The reaction is a serous exudate in the tissue surrounding the focus and constitutes a perifocal inflammation. This may be absorbed completely. In more intense reactions the exudate may proceed to caseation and the whole area of encapsulated, caseous matter may break through and its content of tubercle bacilli spread. The clinical symptoms of focal reaction are fever, pain, increased sputum, shedding of tubercle bacilli and elastic fibres in the sputum. There may be physical signs, including moist râles. Nonspecific "irritation" therapy in tuberculosis may produce the same sort of reaction. To this therapy the early infiltration is a contraindication, as is also favorable progress of the focal disease. Torpid cases of productive-fibrous type, with or without cavitation, are suitable for this sort

of treatment. The irritant must be accurately measured and should have a certain tuberculin-like influence. Tuberculin is easily measured, but a very small excess over the optimal dose may be dangerous. Proteins are little used for this sort of treatment. Metallic salts, especially gold salts, have the disadvantage of damaging the kidneys. Lipoids are sometimes used. Too large dosage may be disastrous.—*Ueber Reaktionen am Tuberkulösen Lungenherd, G. Leendertz, Deutsche med. Wchnschr., June 13, 1930, lvi, 989.*—(*H. S. W.*)

**Intrarenal Arterial Tuberculin Injections.**—Previous studies showed that the injection of the specific protein of tuberculin into the renal artery of tuberculous swine resulted in acute inflammation involving glomeruli and interstitial tissue. A similar injection into normal swine failed to cause an inflammatory reaction, which indicated that the effect in the tuberculous animals was a true tuberculin reaction. The dosage used, while insufficient to produce effects in normal animals, was nevertheless much larger than any amount that could be liberated spontaneously from a focus in an infected animal. It therefore seemed necessary, before application could be made to spontaneous nephritis, to determine if much smaller amounts could produce lesions like those of naturally occurring disease. Monkeys and goats were also used to determine if the condition noted for swine held for other animals. Three monkeys were infected with 0.1 mgm. of human tubercle bacilli. Fifty days later the tuberculin test was weakly positive. In 2 of the monkeys the right kidney was injected with 10 mgm. of coagulated tuberculin protein, and the right kidney of the third with 5 mgm. A week later a specimen of the right kidney was removed. Approximately two weeks later the left kidney of each of the first 2 monkeys was similarly injected. A few days later a specimen of the left kidney was removed. The animals died in a few weeks. The right kidney of two normal monkeys was perfused with five mgm. of coagulated tuberculin protein and a specimen removed. Skin sensitiveness to tuberculin in the tuberculous monkeys was low. Likewise only mild injury of the kidneys of these tuberculous monkeys was produced by injecting a suspension of tuberculin protein containing particles of a sufficient size to obstruct glomerular capillaries. In no case were the inflammatory changes characteristic of the tuberculin skin reaction in sensitive animals found. No changes were produced in normal animals. Six goats were infected and the experiment was carried out along similar lines to that with the monkeys. Goats infected subcutaneously with bovine type of tubercle bacilli rapidly succumbed with extensive pulmonary miliary tuberculosis. One goat out of three so infected, which lived long enough for further experiment, proved strongly skin-sensitive to tuberculin and, on arterial injection of the kidneys with tuberculin protein, developed a moderately acute interstitial nephritis with pronounced tubular degenerative changes. Three goats infected subcutaneously with human tubercle bacilli gave strongly positive tuberculin skin tests five weeks later. Renal arterial injection of the kidneys of these animals resulted in slight tubular degenerative changes in one, acute degenerative changes on the second of two injections, with slight inflammation, in a second, and acute tubular degeneration with many hyaline and waxy casts in a third. A second injection of tuberculin protein into the same kidney of the latter animal three months later led to the production of an enormous number of dense hyaline casts with no appreciable inflammation and little apparent tubular degeneration. Injection of tuberculin protein into normal goats led to no changes except those due to accidental vascular injury. Swine were used in the next experiment. The experimental procedure was similar to that used with the monkeys and goats. Tuberculous swine proved only moderately skin sensitive to tuberculin. Renal arterial injection of tuberculin protein in two tuberculous swine caused profound fatty degenerative changes in the tubular epithelium with hyaline and leucocytic casts. In one of these there was marked and in the other moderate interstitial infiltration with cells of inflammation. A second arterial injection, in the opposite kidney, led to abrupt exitus on the operating table in each of these animals. Two normal pigs, similarly injected, showed no changes except lesions obviously the results of vascular thrombosis or embolism. *Summary:* Distinct renal allergic responses were secured on the injection of tuberculin protein into the renal arteries of tuberculous monkeys, goats and swine. The allergic nature of the response was established by the fact that similar injection into normal controls did not cause injury (except such as occurred from vascular occlusion). In the monkeys the lesion produced was purely degenerative, in the goats chiefly degenerative but occasionally inflammatory, and in the swine degenerative and of a more inflammatory character than in the goats. The inflammation in the goats and swine took the form of an interstitial nephritis. The glomerular changes, observed in a former investigation in which larger dosage of tuberculin protein was used, were not produced. The intensity of renal

tuberculin reaction did not parallel the intensity of cutaneous reaction in this series of animals.—*Results Following Intrarenal Arterial Tuberculin Injections in Normal and Tuberculous Monkeys, Goats and Swine, E. R. Long, C. B. Huggins and A. J. Vorwald, Am. J. Path., July, 1930, vi, 449.*—(*F. G. P.*)

**Action of Antigens of Tubercle Bacillus.**—The tuberculoproteins of the tubercle bacillus possess a certain tuberculin action in that they occasion antibody formation in normal animals, are primarily toxic and stimulate to the formation of clasmatocytes. On the other hand the lipoids of the tubercle bacillus possess no tuberculin action. They can act as antigens in complement fixation with natural tuberculosis serum, are not toxic and stimulate the formation of epithelioid cells. The carbohydrates likewise have no tuberculin action, and form no antibodies, but bind antibodies *in vitro*. The biological action of the latter must be studied further. This is also true of the neutral fats. It is probable that the latter have no tuberculin action and only form specific antibodies when mixed with tuberculoproteins.—*Der heutige Stand der Antigenanalyse des Tuberkelbacillus, M. Pinner, Beitr. z. Klin. d. Tuberk., 1930, lxxiii, 784.*—(*H. J. C.*)

**Effects of Tuberculotoxins on Liver and Spleen.**—An endotoxin from dried tubercle bacilli was extracted with ether. The defatted tubercle bacilli were macerated for 24 hours with physiological salt solution and the filtrate therefrom used. The lipoids in liquid paraffine were also tested. The author describes fibrotic and sclerotic changes in the liver, especially originating from the Kupffer cells, and in the spleen from the sinusoidal endothelium. With larger doses even small focal necroses were noted. There was no essential difference between the fat and protein action. The described changes support the theory of a tuberculous origin of some cases of hepatic cirrhosis.—*Über toxituberkulöse hepatolienale Erkrankungen, A. M. Lewin, Virchow's Arch., 1930, cclxxvi, 101.*—(*H. J. C.*)

**Biology of Lipoids.**—Living tubercle bacilli introduced into living plants (stem, sap or fruit) are without influence upon the plants. The tubercle bacilli, however, show decided changes, which depend upon the type of plants and especially concern the loss of staining property of the bacilli. In certain types the property appears to be specific. It is dependent upon the viability of the plant. In lettuce the action is not as marked as in green tomatoes, while in red tomatoes it is lacking.—*Fünf Beiträge zur Lipoidbiologie, Much, Nyren and Schubert, Centralbl. f. Bakt., I. Orig., 1930, cxvi, 1.*—(*H. J. C.*)

**Early Symptoms and Signs in Pulmonary Tuberculosis.**—With any infection such as phthisis, whose course and manifestations are so irregular and varied, significant symptoms of early changes may be more apparent in one case than another. Grouping of either signs or symptoms will not always denote the incipient case. Whereas in certain diseases a diagnosis may be made by routine examination, in pulmonary tuberculosis the careful history is almost invariably of greater value and more nearly accurate than the physical signs. Perhaps the ability to detect every slight change from the normal in the chest is not the most important acquisition of the examiner. What may be of greater importance is to estimate properly the value of each symptom and sign. In the group of clinical symptoms most common in incipient tuberculosis are found persistent fatiguability, slight afternoon temperature, slow loss of weight, haemoptysis, indigestion and protracted symptoms of a cold; also, especially in children, nightsweats. Fatiguability beyond the ordinary after exertion is not uncommonly the first symptom and may give rise to a diagnosis of neurasthenia. A child who has changed from strenuous habits to lassitude needs a searching investigation of his chest. Following fatigue and accentuating its importance is mild afternoon elevation of temperature; at first occasional, it later becomes established and increases after exertion. In a recent publication from the Peter Bent Brigham Hospital, on *Unexplained Cases of Temperature*, Alt and Barker showed that in a considerable proportion tuberculosis sooner or later becomes apparent. A two-hourly record, using five-minute readings, will give the most valuable results. Again, there may be digestive disturbances in the foreground but their most striking feature is that complete rest alone often relieves them. Loss of weight in phthisis is often marked, sometimes abrupt, sometimes transient, or even absent. An obese patient may suffer from tuberculosis. Haemoptysis often has a deeper significance to the patient than to the unheeding physician, as the former is ready to believe some serious condition responsible, unless thrown off the track by misguided reassurance, and to give full coöperation. A dram of expectorated blood demands careful study and while occasionally its source may be a tracheal varix or a bronchiectasis, in the great majority of cases it is due to pulmonary tuberculosis. Continued symptoms of a chest cold may be another manifestation and

this type of case may present the greatest difficulty in early diagnosis. An accompanying bronchitis often obscures tuberculous activity. The early physical signs of phthisis consist generally of a few constant moist râles in the infraclavicular region. The various types of early lesion may be summarized: *1:* No signs but sputum positive. *2:* Hilum tuberculosis. *3:* Hilum tuberculosis with pulmonary extension. *4:* Localized basal tuberculosis, usually at the bifurcation of the descending bronchus. *5:* Adult apical tuberculosis. The tuberculosis-carrier presents normal physical signs in the chest and a negative X-ray, yet has a positive sputum. Such cases are unusual and only detected by routine sputum examinations. They are of epidemiological, but not clinical, importance. Hilum tuberculosis is the characteristic type of early childhood and may occur in the adult. Its physical signs are spinal and interscapular dulness, increased transmission of whisper over the lower cervical and upper dorsal spines, and at times fine moist râles near the spine. When there is pulmonary extension râles are commoner and abnormal signs may extend to the scapular border. Its location makes this type of lesion hard to detect and it may develop quite suddenly following an acute respiratory infection and with signs so masked that a well-marked lesion is established before it is discovered. The history, duration of symptoms, poor appearance of the patient and X-ray findings will then establish the diagnosis. A diagnosis of basal tuberculosis is rarely made from physical signs unless a bronchopneumonia appears near the angle of the scapula, with corroborative X-ray findings or possibly a positive sputum. In early adult tuberculosis the signs usually appear subapically,—slight dulness, limited apical expansion, slight muscle spasm and a few fine persistent râles. The chief difficulty in detecting tuberculosis early is the failure to suspect it. If then it is approached with a careful case history, laboratory tests, X-ray and thorough chest examination, it will only rarely be overlooked.—*Early Clinical Symptoms and Physical Signs in Pulmonary Tuberculosis, C. Floyd, Meeting Massachusetts Medical Society, June 17, 1930, reported in New England J. M., October 30, 1930, cciii, 856.*—(*A. P.*)

**Rôle of Stethoscope.**—In this presidential address delivered before the Medical Society of London the history of the stethoscope and its various modifications is given. The stethoscope is taken as the symbol or sign of clinical medicine, not that it is regarded as indispensable, but because it is feared that the methodical study of symptoms and physical signs, including the use of the stethoscope, is being relegated to a subordinate position, while laboratory results are too often regarded as oracular or infallible, a claim which the laboratory worker is usually the last to make for them. The times are changing, and this instrument, so long acclaimed as one of the greatest of medical inventions, is now, to judge by recent papers and correspondence in the medical journals, regarded as an almost archaic survival, like the lancet, the bistoury, and the wet-cupping apparatus. In tuberculosis Wood writes that the X-ray tube is a searching and far more accurate instrument than Laennec's tube. The stethoscope should have our veneration for what it revealed in the past, and our respect for what it does in the present. It is regrettable to restrict the term "research" to work in laboratories. What clinicians ask of the laboratory workers are (1) means for assessment of function, and particularly of the minimum organic functions consistent with active life; (2) means for determining the extent and nature of disease processes; and (3) a measure of activity of disease processes produced by infective agents. Tuberculosis of the lungs offers the best medium for teaching physical diagnosis and the use of the stethoscope. The segregation of these cases is starving general hospitals of valuable teaching material.—*The Stethoscope: Past and Present, R. A. Young, Lancet, October 18, 1930, ccxix, 883.*—(*B. T. McM.*)

**Mechanisms of Physical Signs in Lung Diseases.**—Respiratory air passing through a bronchial tube lined with its thin mucosa integral with the annular perichondrium produces no physical sign that is deemed abnormal. For the production of abnormal physical signs, one or more of four conditions must be present: (1) narrowing and enlargement of the lumen; (2) swollen mucosa; (3) projecting abnormal tissue; (4) foreign body, or secretions acting as such (endogenous foreign body). Bronchoscopic observations have determined the fact that there are three different types of bronchial obstruction, comparable in action to the three types of valves in mechanics. In the bronchi there may be (1) stop-valve obstruction, in which no air passes in or out of the tributary area of lung, resulting slowly in atelectasis from absorption of the contained air, and later in drowned lung; (2) by pass-valve obstruction, in which a diminished amount of air passes both in and out; and (3) check-valve obstruction, in which air is permitted to pass one way only, either in or out, rapidly resulting in emphysema or atelectasis according to the setting of the valvular mechanism. Check valves may be formed by

inspiratory enlargement and expiratory diminution of the lumen of infiltrated or inflammatory bronchial walls as well as by mobile tissues or secretions that form ball-valves or flapping valve mechanisms. Alternate expansion and contraction of the thorax in the respiratory cycle may be considered as a reciprocating pump. In mechanics a reciprocating pump may be made to pump air in or out of a reservoir according to which way the check-valve is set. In a similar fashion, air may be pumped in or out of the tributary area of lung, resulting in either emphysema or atelectasis, according to the setting of the check-valve mechanism. One type of obstruction may follow another, and in some cases two types may alternate. Full comprehension of the mechanism of each of the three types of bronchial obstruction is necessary for the proper interpretation of the physical signs; and, properly interpreted, the signs in the respective condition become of the utmost diagnostic importance. Bronchial obstruction is so often associated with a normal or hyperresonant percussion note that the utmost care in accurately determining the character of the breath-sounds is necessary for exclusion of the minor degrees of the check-valve type of bronchial obstruction. Atelectasis in children is so often due to bronchoscopically curable valvular obstruction that the diagnosis of other types of atelectasis should not be made until after diagnostic bronchoscopy has excluded bronchial obstruction.—*The Mechanism of Physical Signs in Neoplastic and Other Diseases of the Lung: with Especial Reference to Atelectasis and Emphysema, C. Jackson, J. Am. M. Ass., August 30, 1930, xcv, 639.* —(*G. L. L.*)

**Cog-Wheel Breathing.**—The general opinion of writers on this subject seems to be that cog-wheel breathing has sometimes a pathological, sometimes a functional, and sometimes a physiological origin; that at times it indicates early tuberculosis, and at other times has little or no significance. A study of 1000 cases was made in an attempt to determine the value of cog-wheel breathing as a physical sign. The cases consisted of 428 men, 409 women, and 163 children under 16 years of age. In 292 of these pulmonary tuberculosis was diagnosed, while in the majority of the remaining 708 cases no pulmonary lesion was apparent. Cog-Wheel breathing is of two kinds. The first type is uncommon. In it the respiratory interruptions are irregular, and are due probably to irregular action of the respiratory muscles. In none of the 1000 cases could it be ascribed to a pulmonary or pleural lesion, and, when heard, it was noticeable only when the patient was breathing forcibly. Breathing of the second type is not uncommon. The interruptions are regular, have a cardiac timing, and are best termed air-waves. They are heard in inspiration, rarely in expiration. Though synchronous with cardiac systole, they are breath-sounds, not heart-sounds, for they cease when the breath is held and the heart-sounds may be audible in their place. Their intensity varies in different persons, but is constant for the individual. Air-waves are heard best near the angle of the left scapula or in the axilla, and appear to be more obvious in cases of fibrosis. They were found in 30 per cent of men, in 53 per cent of women, and in 19 per cent of children under 16 years of age in the 1000 cases investigated. The percentages of cases with air-waves were higher in the tuberculous than in the nontuberculous. This difference is probably of no significance, for the situation of the air-waves bore no relation to the site or character of the lesion, and probably is to be accounted for by a more forcible cardiac action in the tuberculous. The situation of the air-waves and the demonstration of pressure fluctuations, synchronous with cardiac systole, in the pneumothorax cavities of some patients and in the inspiratory and expiratory currents of air of others, suggest that they are caused by an expansion of the lung compensatory to the contraction of the heart. It is reasonable to suppose that air-waves, inspiratory and expiratory, could be heard in all individuals if the auscultatory test were sufficiently sensitive. Certain cases of so called exocardial murmurs and of pleuropericardial friction are probably merely instances of air waves.—*Cog-Wheel Breathing, G. T. Hebert, Lancet, September 20, 1930, ccxix, 628.*—(*R. M. F.*)

**Percutory Demonstration of Infraclavicular Infiltrations.**—It is a well-known fact that infraclavicular infiltrations, even when cavity-formation has occurred, are frequently not demonstrable by percussion. It was observed in a considerable series of patients that a marked dulness could be demonstrated if percussion was done on the patient in recumbent position, while no change of percussion sound was demonstrable while the patient was standing. It is advocated, therefore, to percuss patients always both in erect and recumbent posture.—*Zur Erleichterung des perkutorischen Nachweises infraclaviculärer Lungenprozesse, A. Kirch, Wien. klin. Wchnschr., January 30, 1931, xliv, 145.* —(*M. P.*)

**Classification of Pulmonary Tuberculosis.**—In order for any classification to be universally acceptable, it must be based upon

fundamental concepts known to all physicians. It must be expressed in language understandable by all and it must be simply and easily applied. Since all diseases of the lower respiratory tract involve separately or in combination the lungs, pleura and bronchi, the following classification has been devised: *A. Active Forms: 1:* Acute or subacute bronchopneumonia with degenerative changes predominating (congestion, haemoptysis, ulceration). *2:* Chronic bronchopneumonia with regressive changes predominating (fibrosis with bronchiectasis, ulceration). *3:* Acute or subacute pleuropneumonia with degenerative changes predominating (congestion, haemoptysis, caseation with or without ulceration). *4:* Chronic pleuropneumonia with regressive changes predominating (fibrotic alveolitis, pleuroparenchymatous adhesions). *5:* Generalized miliary tuberculosis. *B. Inactive Forms: 1:* Retractile pleuropulmonary fibrosis (total or partial fibrothorax). *2:* Inactive fibrotic cavities. *3:* Atrophic emphysema. *4:* Pulmonary cirrhosis (especially apical cirrhosis). The active forms may be further subdivided into the small or large, disseminated or circumscribed foci. The diagnosis of active lesions usually presents no difficulties. The following findings are helpful in diagnosing an inactive lesion: *1:* The fixation or diminution in auscultatory signs which must remain for the most part bronchial in character. *2:* Absolute and persistent absence of purulent expectoration and the constant absence of tubercle bacilli in the sputum. *3:* Apyrexia. *4:* Increase in body weight. *5:* Appearance or accentuation of changes in the peripheral circulation. The present-day classifications of the adventitious sounds perceived by auscultation are very unsatisfactory because the mechanism involved in their production is poorly understood. The author stresses the variations in the intensity of the tonal qualities of the sounds. A colorimetric method of charting the physical signs perceived through a specially devised stethoscope is described.—*Una classificazione semplice delle forme di tubercolosi polmonare e un metodo pratico-grafico-cromatico di segnalazione semeiologica, F. Parodi, Tubercolosi, September, 1928, xx, 319.*—(*U. E. Z.*)

**Diagnosis of Pulmonary Tuberculosis.**—The death-rate from pulmonary tuberculosis has decreased in both sexes and in all age-groups except in females from 15 to 25 years of age. It has even increased for this group in some districts. A causative factor may be the lack of rest in the life of women in business. Roentgenology has changed the concept of twenty years ago that phthisis begins at one or other apex and spreads downward by "apicocaudal progression," and that once caseation and cavity-formation occur the disease is incurable. The finding of tubercle bacilli in the sputum and the hearing of crepitations were considered evidence of advanced disease and attempts were made to elicit physical signs of early infiltration. If we exclude mild latent infections, primary infections of the childhood type, lesions situated above the clavicle, and certain of the more chronic fibroid types of the disease occurring in later life, pulmonary tuberculosis remains one of the most fatal of all diseases and one of the most difficult to treat, even in its early stages. A detailed comparison of early and modern roentgenograms shows the improvements that have been made. Roentgenology has shown that the common onset of the early case of tuberculosis is an area of bronchopneumonia situated below one or other clavicle, and revealed as a small area of coarse mottling in the centre of which cavity-formation may be seen. Less commonly the lesion may be located in the lower lobe or above the clavicle. The latter form is relatively benign and tends to heal spontaneously. Still more rare is the "snow-storm" appearance due to miliary tuberculosis in which all areas of the lung fields exhibit a fine stippling. Roentgenology has shown that miliary tubercle is not inevitably fatal unless it is a part of a tuberculous septicaemia. Disseminated tubercle gives rise to coarser granular opacities, each of which may become calcified though fusion and breakdown are more common. Pleural infections are not considered. Physical signs may be absent over early infiltrations or even cavities, more than 50 per cent of which are absolutely or relatively silent. Cases illustrating the superiority of X-ray examination over physical examination are described. When the X-ray is not available a diagnosis of tuberculosis is favored by certain findings as follows: *1:* The tendency of the tuberculous to minimize symptoms. *2:* A history of close contact, or of pleurisy with effusion. *3:* A febrile attack, resembling influenza, in a young person. *4:* Cough with expectoration persisting for more than a week. This calls for at least three sputum examinations. *5:* Lassitude, often preceding and accompanying the cough. *6:* Haemoptysis in a young person, and persistent loss of weight. The most significant physical sign in the early case is the hearing of crepitations. The usual sites are below the clavicle, in the axilla, and internal to the spine of the scapula. Examination should always include auscultation during inspiration after cough. Changes in breath-sounds are of little value in the early case. A single positive sputum without other evidence of tuberculosis is not conclusive

proof of the disease. It is unlikely that tuberculosis is responsible for cough if there is no history of pleural effusion, or of haemoptysis, if no crepitations are heard in any of the danger zones after cough, if no tubercle bacilli are found in three successive sputum examinations, and if X-ray examination is negative. A short period of observation is advisable in all cases. Rest remains the only effective form of therapy. Bed-rest alone is sufficient in favorable cases where time is no object. Collapse therapy shortens the resting period and may bring comfort to the incurable. Diagrammatic sketches of the lungs are used to illustrate the various points discussed.—*Pulmonary Tuberculosis in General Practice, with Special Reference to the Diagnosis of the Early Case, W. B. Wood, Lancet, October 4, 1930, ccxix, 726.—(R. M. F.)*

**Diagnostic Evidences of Tuberculosis.**—Three hundred and fifty consecutive patients examined in a tuberculosis dispensary during a period of five years were studied as to the value of physical signs in the diagnosis of pulmonary tuberculosis. A diagnosis based on symptoms alone, as lassitude, cough, dyspnoea, loss of appetite, should not be made, as these are symptoms of bacterial toxaemia and are not specific for any one organism. Lawrason Brown, from his experience at Trudeau Sanatorium, has given "five cardinal signs:" (1) presence of tubercle bacilli in the sputum, which is obviously conclusive; (2) pleurisy with effusion, if otherwise unexplained, must make one suspect active disease; (3) haemoptysis also should cause suspicion of active disease; (4) with moderately coarse râles above the level of the second rib in front or the third vertebral spine at the back, the case should be considered as one of active pulmonary tuberculosis until the contrary is proved; (5) a parenchymatous lesion of the lung, as demonstrated by X-ray, in the location described above, if the only sign, is evidence of the presence of "non-clinical" disease. Of the 246 patients diagnosed as suffering from active pulmonary tuberculosis in this series, 195, or 80 per cent, had positive sputum at some time during their illness. Of these 246 cases, there was a history of pleurisy in 17 cases, and pleurisy with effusion in 6 cases. These effusions were otherwise unexplained. They were of the type which occurs in the course of pulmonary tuberculosis. Tubercle bacilli are sometimes demonstrated in effusions of this nature, and as a matter of experience their occurrence is frequently followed, whether treated or untreated, by the appearance, after months or years, of tuberculous changes in the lungs. Furthermore, in four instances, effusions occurred during the known course of pulmonary tuberculosis. Of 195 cases, which at some time during their course had positive sputum, haemoptysis occurred in 30 per cent. Of the 51 cases diagnosed as tuberculous, but with a negative sputum, haemoptysis occurred in 49 per cent. Of 35 patients considered nontuberculous, haemoptysis in 10 cases was the reason for which treatment was sought. A parenchymatous lesion shown by X-ray is useful confirmatory evidence. It is important to distinguish this from the uniform opacity or the "ground glass" appearance indicative of thickened pleura. No indication is given by X-ray examination as to whether the disease is active or quiescent, or as to whether or not it is tuberculous in nature. Limitation of movement of the diaphragm is due probably to pleurisy with involvement of the phrenic nerve in adhesions. The experience gained in dealing with these patients supports the findings of Brown. The complement-fixation test and subcutaneous tuberculin test gave no further help beyond what was available from clinical and radiological evidence. Pyrexia and tachycardia, otherwise unexplained, are signs which call for considerable attention. "Cog-wheel respiration" appeared in early apical pleurisy. Clubbing of the fingers, dilated vessels at the base of the neck, d'Espine's sign and Eustace Smith's sign are not pathognomonic of tuberculosis.—*A Survey of Some Findings in Five Years' Work on Tuberculosis, J. A. Struthers, Tubercle, October, 1930, xii, 1.—(M. E. P.)*

**Tuberculosis Patients and Diagnosis.**—Twenty-five years ago Osler said, "There is no greater mistake than to keep from the patient the knowledge that she has tuberculosis in its early stages, as it is only by having that knowledge that she can be expected to recover." This is reiterated in somewhat different form by John Potts, who holds that, if the physician diagnoses the disease early and informs the patient, the responsibility is definitely placed where it belongs, the patient is given his best chance, and the doctor has a clear conscience. Without definite data to prove it, the statement is probably quite true that to-day many more patients are informed promptly of having tuberculosis than a quarter of a century ago. Fifty-nine per cent of 1499 sanatorium patients whose histories were studied by the National Tuberculosis Association felt quite sure that they were informed by the physician of having pulmonary tuberculosis the very day of the diagnosis and an additional 28 per cent within a month. Only 33 were sure that a year or more elapsed between the diagnosis and its statement to them. In

this particular study each patient was asked his attitude upon being so informed and out of these answers certain definite facts emerge to indicate that there is less reason for withholding the diagnosis than many physicians think. Twelve per cent of the patients were not at all surprised. Many had tuberculous relatives and were familiar with the symptoms. Some had long suspected the presence of the disease. Twenty-six per cent of the patients expressed themselves as appreciative, grateful or relieved, and frequently also harbored resentment toward the physician who had failed to make the diagnosis or to inform them of it. Another 10 per cent were quite ready to coöperate in beginning proper treatment, and 2 per cent stated simply that they accepted the diagnosis. Another 20 per cent stated that the diagnosis left them more or less unaffected. Some of these were very ill, others apparently did not realize the seriousness of the situation, while still others were philosophical about it. Nine per cent disbelieved or doubted the diagnosis, and some of these were hostile or indifferent, yet in many instances it was reported that the diagnosis was accepted after confirmation by a specialist or by X-ray or sputum examination. In a considerable number of cases, however, the diagnosis was accepted only after examination at the sanatorium. Eighteen per cent of the patients were disturbed in varying degree to learn they had tuberculosis but only five altogether stated that they wished they had not been told, and with these depression later gave way to a better mood. Only about 4 per cent in all stated that they "went to pieces," "gave up hope," collapsed, etc. This study, therefore, indicates that physicians have few grounds upon which to base their reluctance to tell patients they are tuberculous. Even the argument that this may cause them to change physicians does not hold, since many more changes were made by these patients before the diagnosis was established than afterwards. Many patients were less worried and discouraged after learning the actual truth. Certainly it is the rare patient who will not follow instructions better when told he is tuberculous than if left in ignorance. It is to be expected that he will at first be emotionally disturbed but it appears that the degree of depression is often related to the manner in which the nature of his illness is explained. This study shows that only in rare instances is it inadvisable for the physician to take him into his confidence.—*The Patient's Reaction to a Diagnosis of Tuberculosis, L. R. Williams and A. M. Hill, New England J. M., December 4, 1930, ccciii, 1129.—(A. P.)*

**Differential Diagnosis in Dispensaries.**—Patients complaining of progressive loss of weight, fever, cough, haemoptysis, etc., are considered as potential cases of pulmonary tuberculosis, but these symptoms are not uncommon in other pulmonary and extrapulmonary lesions. In order of frequency, the author considers the following conditions: diseases of the upper respiratory passages; mitral stenosis; syphilitic aortitis; neoplasm of the lung; bronchiectasis; hyperthyroidism; pneumonomycoses and pneumonoconioses.—*Problems of Differential Diagnosis at a Tuberculosis Dispensary, P. Ellman, Tubercle, September 1930, xi, 531.—(M. E. P.)*

**Roentgenograms of Chest.**—*Part I:* Accurate definition of the normal lung is made difficult by its variability of structure. Linear markings are heaviest at the hilum and extending from this toward the apices and bases, while near the periphery the lung assumes a marbled appearance. Linear markings are exaggerated by congestion, or by pneumonoconiosis. The hilum in the adult probably never represents an anatomically normal condition. Bronchial tubes in cross-section appear as ring shadows. Lymph nodes are not seen as independent shadows unless diseased. Attempts to dissect roentgenograms and to regard all adventitious shadows as pathological have led to such misconceptions as "peribronchial phthisis" and "hilum tuberculosis." It is best to repeat every roentgenogram under precisely similar conditions. *Pulmonary Tuberculosis:* The earliest infiltration in the adult is most commonly situated just below and external to the centre of the clavicle. The presence of fine stippling or mottling of the lung parenchyma, with any corroborative clinical evidence justifies a diagnosis of tuberculosis. Clinical evidence without such parenchymal changes is not conclusive proof of tuberculosis, and further X-ray examination is necessary. The initial lesion is probably in the parenchyma, and is soon followed by reaction in the lymph nodes, which has no constant relation to the size of the lesion. Tuberculous lymph nodes usually show calcification. Contraction of scar-tissue may draw the mediastinum out of position. Further infiltration in the opposite lung usually occurs in the central peripheral portion. The margins of a cavity are ragged, while those of a pneumothorax cavity are sharply defined. So called "annular shadows" are regarded as representing cavities. In miliary tuberculosis the lungs are studded with bead-like opacities. The change from soft stippling and mottling to more linear opacities indicates fibrosis. *Bronchiectasis:*

In a typical case mainly fibrosis is seen, with diminution of diaphragmatic motion on the diseased side. When lipiodol is injected the dilated bronchi are outlined. *Pneumonoconiosis:* The earliest mottling is as fine as that of miliary tuberculosis and involves the whole lung except the apices and at times the periphery, the normal linear striations being obliterated. Later the bronchial lymph nodes enlarge and the lung shows the linear streaking of fibrosis. Tuberculosis may cause conglomeration of the mottling. *Pleurisy:* In the dry type there is invariably some inhibition of the diaphragm on the affected side. An effusion is at first horizontal in position, the costophrenic angle being obliterated. Later the characteristic curve develops. *Part II:* Roentgenography facilitates early diagnosis and localization of pulmonary neoplasms. Mediastinal tumors initiate symptoms sooner than those in the lung. The commonest form of benign intrathoracic tumor is the fibroma or combination of fibroma and lipoma. Most benign growths are extrapulmonary in origin. Fibromata usually arise posteriorly from the periosteum of a rib or the endothoracic fascia, occasionally from a bronchus. Teratomata originate either from the third or fourth branchial clefts or from the remains of the thymus gland, and thus are always situated anteriorly. They are extrapulmonary, but tend to become adherent to the lung and pleura. They are more irregular in shape than fibromata, though of equal density. Teeth or bone fragments may be seen. Simple cysts occur, though they can not be differentiated roentgenologically from hydatid or echinococcus cysts. Hydatid cysts appear as well rounded or oval opacities with a homogeneous centre, may be single or multiple, are commonly situated in the right lower lobe, and set up much local irritation. Carcinomata are the most common of the malignant neoplasms. It is doubtful whether primary sarcoma of the lung ever occurs. Primary bronchial carcinoma arises from bronchial mucosa. Three types are described, as follows: *1:* Those involving an upper-lobe bronchus with atelectasis of the upper lobe. *2:* Those involving the hilum with blockage of a bronchus, subsequent atelectasis, invasion of lung tissue, and enlargement of the bronchial lymph nodes. Differentiation from interlobar empyema may be difficult. *3:* Those involving the lower lobe. The lobe is irregularly opaque and pleural effusion and central necrosis develop early. Distinction from abscess of the lung and bronchiectasis may be difficult. Artificial pneumothorax and intratracheal injection of lipiodol aid in the diagnosis of both malignant and benign growths. Primary endothelioma is rare. If the lung is collapsed, it produces irregular opacities on the pleural surface. There is no definite roentgenological difference between the appearance of metastases of sarcoma and carcinoma. The rate of growth is more rapid for sarcomata. In both types the lungs appear to be studded with woolly opacities varying in size from a bean to a tennis ball. In miliary carcinoma the lungs are completely studded with shadows somewhat coarser and denser than those of miliary tuberculosis. The pleura is frequently involved. *Part III:* Tumors occurring in the mediastinum are classified as follows: (1) inflammatory conditions (especially tuberculous lymph nodes); (2) lymphoma and lymphadenoma; (3) fibroma, lipoma, enchondroma, or a tumor combining cellular elements of each; (4) dermoid cyst and teratoma, (5) hydatid cyst; (6) sarcoma (especially lymphosarcoma); (7) carcinoma; (8) syphilitic gumma; and (9) aneurysm of the arch of the aorta. Mediastinal neoplasms may arise from the lung tissue, though rarely; from the periosteum of the sternum (sarcoma); from the bony structures (chondroma); from the lymph nodes, either primarily or by extension from the cervical or the posterior mediastinal nodes; or from the thyroid or thymus glands. Differential diagnosis has to be made between lymphadenoma, aneurysm of the arch of the aorta, sarcoma arising either from mediastinal nodes or from remains of the thymus, and tumor of the thyroid gland. Clinical and laboratory data of value are described. Roentgenograms are described as follows: *1: Lymphadenoma:* A fairly well defined opaque mass, usually unilateral, is seen in the mediastinum. *2: Aneurysm:* A well-defined rounded opacity is seen in the upper part of the mediastinum. Examination in the lateral oblique plane is essential, and shows the presence of the characteristic "clubbing." Other mediastinal tumors will exhibit pulsation acquired from their relationship to the aorta, which cannot be distinguished on the fluorescent screen. Persistence of signs for eighteen months is in favor of aneurysm. *3: Sarcoma:* Though originating on one side, a lymphosarcoma frequently invades both sides of the mediastinal space, causing lateral compression and deviation of the trachea. Transmitted pulsation is frequently present. Erosion of the bony structures is less frequent than in the case of aneurysm. *4: Tumor of the Thyroid:* Examination in the lateral plane will reveal a tongue-like process growing downward and forward, and depressing the arch of the aorta. This depression clearly demonstrates the situation of the growth. Such tumors are of rare occurrence. Roentgenograms illustrat-

ing the points discussed are reproduced.—*Radiograms of the Chest. (With Illustrative Plates). Part I. Normal and Infective Conditions, Part II. New Growths of the Lung, Part III. Tumors of the Mediastinum, L. S. T. Burrell and S. Melville, Lancet, October 4, October 11, October 18, 1930, ccxix, 759, 813, 865*—(*R. M. F.*)

**Roentgenography in Early Diagnosis.**—By definition, diagnosing early pulmonary tuberculosis should mean the discovery of the tuberculous lesion while the involvement is at its minimum, the patient not toxic and with few or no symptoms. Without early X-ray, such a diagnosis can not be made. The X-ray should be made early, perhaps at the first visit. The Chadwick Clinics, representing the Massachusetts Ten Year Childhood Tuberculosis program, are more and more dependent on early X-ray examination for diagnosis. In the past there were two reasons why it could not be more depended on as an aid: (1) the X-ray plate and (2) the X-ray man. The plate was not taken with modern apparatus, the technique was not well perfected, and the quality of the picture was usually poor and sometimes very poor. Distortion and movement were factors. Roentgenologists tell us not to try to interpret poor films, yet in early days most of their work consisted in doing just this. With technical improvements our knowledge of roentgenographic pathology has developed. The history, symptoms and signs may be those of bronchial asthma and the sputum negative, yet a tuberculous lesion shown by X-ray to be the cause of the symptoms. In all differential diagnosis early X-ray is indispensable. If this be true, who then should not be X-rayed? Certainly the patient with the cigarette cough or hack, the tall undernourished and somewhat run-down young man with no cough, the patient with a history of blood-spitting, all require it, and the earlier the better. Do not say an X-ray will do no harm but that it is absolutely indicated. The decision that a child is not tuberculous should not be made without X-ray examination of the chest, except when the intracutaneous tuberculin test is negative. Likewise the orthopaedic case, the patient with extrapulmonary tuberculosis, should have the chest X-rayed. And again, in relation to the applicability of artificial pneumothorax, it is of great aid. The unilateral case may be discovered and modern treatment applied before it becomes bilateral. *Technique:* Technicians are becoming better and better trained. Methods vary somewhat according to individuals and the apparatus in use. The following points are preferred by Davidson: *1:* P. A. position, standing, hands on hips, thumbs and elbows forward, feet flat, chin over top of cassette, chest bared in proximity, a moderately deep breath held. *2:* Distance 6 feet. K. V. P. 76, Pr. V. 142, MA 100. Time 1/20 to 1/10 second. Double screens. Extra rapid exposure is of doubtful advantage and has not been sufficiently studied. Stereoscopic films have rarely shown more than good flat ones. Oblique, rotated or lateral views are often of advantage, and sometimes views of the apices alone. Fluoroscopic examination should go along with roentgenographic, and dark-room technique is highly important. Interpretation should follow a regular order or system. *Classification:* McPhedran, in the brochure on *Childhood Type of Tuberculosis*, published by the National Tuberculosis Association, has set forth a most excellent classification for the lesions of childhood and adolescence. He recognizes the following: (1) focal tuberculosis, (2) tuberculous consolidation, (3) localized lobar or wedge-shaped consolidations, usually benign, (4) diffuse infiltration, childhood type, (5) uncalcified tuberculosis of tracheobronchial lymph nodes, (6) calcified tuberculosis of tracheobronchial lymph nodes, (7) apical adult-type infiltration. *Conclusions: 1:* X-ray your chest case early. Why not at the first visit? *2:* Do not depend on the X-ray alone for diagnosis. *3:* Do not ask the X-ray man to make a diagnosis for you but with you. *4:* Make frequent X-rays of the case under observation. *5:* Do not attempt to read poor films. *6:* In hospital and clinic work try to pick out the film going with each case. It is good training. *7:* Remember that the X-ray man is as entitled to the history and laboratory findings as the clinician. The latter would not give an opinion from physical signs alone. *8:* Compare history and physical signs with the X-ray film.—*Early X-ray—Early Diagnosis, W. B. Davidson, Meeting Massachusetts Med. Soc., June 17, 1930, in New England J. M., October 30, 1930, cciii, 860.*—(*A. P.*)

**X-Ray Evidence of Early Infiltration.**—Early infiltrations are frequently detectable by roentgenological methods only. Their localization is often in the infraclavicular region, or in the more caudal portions of the upper lobes; sometimes it occurs in the apex of the lower lobe, and rarely in the apices of the upper lobes. The youngest lesions produce a homogeneous shadow with blurred outlines which, later, is dissolved into single patches. Frequently linear markings, the roentgenological evidence of lymphangitis and perivascular and peribronchial oedema, connect the parenchymal shadow with the hilum. The further development

is resorption, central caseation with fibrous encapsulation, or spread. The latter starts usually with an increase in the size of the original focus and with the appearance of small nodular foci in its neighbourhood,—foci of bronchial dissemination which frequently localize near the lobar margins. Coincident with this development, an area of decreased density develops in the centre of the first focus, the roentgenological evidence of excavation. Although spontaneous retrogression is still possible at this stage of the disease, the more frequent development leads to further bronchial dissemination. During the development of such processes, it has been observed not infrequently that spread from the first infraclavicular lesion leads to the involvement of previously clear apices. Shadows closely simulating those of early infiltrations may be produced by pulmonary gangrene and by influenza pneumonias.—*Das tuberkulöse Frühinfiltrat im Röntgenbild, F. Fleischner, Wien. klin. Wchnschr., February 20, 1931, xliv, 267.*—(*M. P.*)

**Rapid Diagnosis after Animal Inoculation.**—When pulmonary secretions, milk or other products containing tubercle bacilli are injected into guinea pigs the incidence of positive results is higher than when other methods are employed. If guinea pigs are injected subcutaneously, or intramuscularly on the inner side of the hind leg near the popliteal lymph node, this latter tissue often becomes infected. In some cases, even by the eleventh day these nodes are swollen and, when extirpated, show tubercle bacilli. Infrequently, however, these changes occur only after six to eight weeks, so that negative findings are not conclusive before that time. The attempt to use cultures on Lubenau or Petragagni's media have not proved very encouraging. The percentage of positive findings is considerably less than that of animal inoculation.—*Beschleunigter Nachweis von Tuberkelbazillen im Tierversuchdurch Drüsenexstirpation, C. Ehrlich, May 2, 1930, lvi, 734.*—(*H. S. W.*)

**Quantitative Sputum Examinations for Tubercle Bacilli.**—The methods of determining numbers of tubercle bacilli in sputum by culture and in the counting-chamber have their draw backs. The author used smears to which were added known amounts of yeast, and by comparing the number of tubercle bacilli with the number of yeast cells found quantitative comparisons of sputum possible. The yeast cells were counted in the unstained preparation. Sputum must be homogenized by means of normal alkali before the addition of the yeast and then neutralized with normal sulphuric acid. At least 25 fields are counted in making the examination. The method can only yield approximate results, however.—*Methode zur Bestimmung der Gesamtbacillenzahl, E. Butschowitz, Zeitschr. f. Tuberk., 1930, lv, 321.*—(*H. J. C.*)

**Hohn's Sulphuric-Acid Method in Sputum Diagnosis.**—In 17 cases with positive sputum, cultures were obtained by the Löwenstein-Hohn procedure, while in 80 suspected sputa the antiformin method gave 4 positives and the Löwenstein-Hohn procedure thirteen. The results with cultures were as a whole more rapid than animal tests. Timothy, smegma and similar acid-fast bacilli were destroyed by the sulphuric acid, but "trumpet bacilli" were not. *Züchtungsergebnisse und Abtötungsversuche mit dem Hohnschen Schwefelsäuerverfahren, K. Walther, Centralbl. f. Bakt., I. Orig., 1930, cxv, 235.*—(*H. J. C.*)

**Diagnostic Tuberculin Tests.**—In 1916, Craig applied Hill's multiple-puncture method of vaccination against smallpox to testing for skin-sensitivity to tuberculin. The method has not had the popularity which it deserves. The superior accuracy of the Mantoux, or intracutaneous tuberculin test is admitted; and its routine use in hospitals and dispensaries, at least in acutely ill patients, is advised. Yet there is a real demand for a simple cutaneous or intracutaneous test which does not require the use of a hypodermic syringe. This is especially the case in office work, in schools, and in orphan-homes. The frequently-noted objections to the Pirquet test are its relative inaccuracy, the trauma, and the fact that the tuberculin may be wiped off too soon. The objections to the Mantoux test are the skill required, and the possibility of systemic reaction from unduly deep injection of the tuberculin. The latter misfortune occurred in three of 115 tests performed by the authors. By the Craig method of multiple-puncture by a solid needle, only the intracutaneous tuberculin is responsible for the reaction. The size of the reaction is almost always less than that of the Mantoux test. Of 115 children between 6 months and 14 years of age, tested by both methods in the Denver Orphans' Home, 23, or 20 per cent, reacted positively to both tests. In another group of 283 school children in Aurora, a suburb of Denver, the two tests tallied similarly.—*Diagnostic Tuberculin Reactions: the Mantoux versus the Craig Test, R. P. Forbes and C. L. Steinberg, Am. J. Dis. Child., December, 1931, xl, 1230.*—(*P. J. W.*)

**Vernes Test.**—The appearance of flocculation, when a normal or pathological serum is placed in contact with certain colloidal solutions, is an established fact, to which Vernes drew attention. He showed that slight variations could be appreciated and measured with precision, thanks to the "photometer," which is able to register slight differences in the optic density of mixtures, that the intensity of flocculation differs considerably when the proportions of serum and colloidal solutions are varied, and that certain sera flocculate much more intensely than normal sera. He finally declared that mixtures of tuberculous sera, in proper proportion with a resorcin solution, possess a high flocculating power not met with in normal sera. *Value of Test in Diagnosis of Tuberculosis:* Romano and Croveri studied 100 patients, some tuberculous, some not, and thought the results agreed well with the clinical findings, as did Paillard and others. Langeron and d'Hour obtained 97 per cent positive results in grave tuberculosis, while 86 per cent of old, apparently cured cases were negative. Baylis believed the reaction useful in diagnosis. Jacquot and Uffoltz practised the test in a large number of patients. Of 695 cases of open pulmonary tuberculosis, 640, or 92.1 per cent, gave positive reactions. Of 142 with closed active tuberculosis, only 43, or 30.3 per cent, reacted positively. In 29 cases of closed inactive disease, only 4 positive reactions, or 13.8 per cent, were obtained. Hinault and Prétet, studying 303 cases of pulmonary tubrculosis, obtained 80 per cent of positive reactions in active forms and 46 per cent in "stabilized" or "cured" forms. Gernez and Breton, after studying several hundred subjects, concluded that in active febrile pulmonary tuberculosis with impaired general condition, the reaction was positive in 98 per cent; with good general condition, in 73 per cent; and in clinically cured cases, in 9 per cent. The present study was made on hospitalized patients, who had the advantage of careful clinical, bacteriological and roentgenographic studies. The Vernes reaction was carried out on 138 patients with manifest pulmonary tuberculosis and positive sputa, with 133 positive reactions, or 96.4 per cent. In pleural tuberculosis also the reaction is almost always positive, but it is variable in lymphatic or osteoarticular cases (60 per cent positive according to Gernez and Breton, 64 per cent according to Jacquot and Uffolz). Interesting as are these results they do not prove the value of the test. It is first of all necessary to make sure it is really specific and does not occur in nontuberculous affections. Vernes himself noted that it might be positive in patients with primary syphilis, as did also Payenneville and Marie. Gernez and Breton, and later A. Breton, found quite frequent positive results in various acute infections, such as typhoid fever, scarlet fever, mumps, diphtheria, streptococcus septicaemia and acute articular rheumatism. Positive reactions were also noted in secondary and tertiary syphilis. Breton found 31 per cent positive reactions in 71 individuals with chronic nontuberculous affections, and the authors obtained 2 per cent positives among 87 subjects with diverse chronic nontuberculous affections, in which there was no question of the coexistence of tuberculosis. Many pulmonary affections which simulate tuberculosis give high indices, such as malignant granulomatosis, grippe, mediastinal and pulmonary cancer, gangrene, syphilis and bronchiectasis. In normal healthy persons there is general agreement that only exceptionally do high indices occur. If the reaction is positive in an open active case of tuberculosis it does not seem to be of great practical interest because the diagnosis is readily made by other means. It cannot be substituted for those other means because in a small proportion (4 per cent) it is negative. It is in the fibroid cases that the percentage of positives is lowest, which is the group in which such a test would be most needed. On the other hand, one runs the risk of diagnosing as tuberculosis many diverse affections. *Value of Vernes Reaction as a Measure of Tuberculous Infection:* Vernes and others believe the intensity of flocculation of the serum-resorcin mixture indicates the intensity and gravity of the tuberculous infection and that a serial curve of measurements parallels faithfully the course of the disease. Some believe the prognosis can be deduced from such a curve. Badoux and Narbel, studying 197 cases, concluded that the general condition seriously affected the reaction. Courmont, Gaté and Schoen found agreement between the reaction and the clinical course in two-thirds, and disagreement in one-third. Pierret and Breton found valuable results in patients treated by artificial pneumothorax, an ascending curve indicating serious complications or developments on the opposite side. The author's studies show that patients with extensive caseous lesions and marked toxaemia almost always show high indices, usually over 100, while those in good condition have but little elevation. There are, however, enough exceptions to make any notion of "tuberculometry" illusory. In general it may be said that there is a parallelism between the serological curve and the clinical course. Latent forms, manifesting themselves only by positive tuberculin reactions, generally show an index below 30. Active febrile forms show high

figures. A certain number of discordant results have been observed in adults treated by artificial pneumothorax. Practically, with so many criteria for evaluating the intensity of the infection and activity of the lesions, the addition of this serological reaction appears rather superfluous. And the observations made by the authors and others seem to show it is impossible to base a prognosis on the results of this test. *Vernes Reaction and Complement Fixation:* Prunell considers the flocculation test more sensitive than the fixation reaction and more often positive in confirmed tuberculosis. On the other hand, its lack of specificity leads to positive results in nontuberculous conditions. A combination of the two tests may furnish better information than either alone. *Serofloccula-tion and Erythrocyte Sedimentation:* Olbrechts and Vanderbeken find both reactions indicating a state of the organism without defining its origin. In practice the sedimentation test is the more simple. *Conclusions: 1:* The resorcin reaction is almost always positive in active forms of tuberculosis and negative in normal subjects. But it frequently gives positive results in the presence of acute or chronic nontuberculous conditions. In latent cases it is most often negative. Therefore it can scarcely be used to advantage for diagnosis in dispensary work. *2:* The serological curve often, but not always, parallels the development of the disease and constitutes an element of appreciation comparable to the indications furnished by a study of the general symptoms, the weight curve and the temperature record. Contrariwise, these findings are not sufficient to base a prognosis on, even in the near future. *3:* The information furnished by serofloccu-lation is comparable to that given by red-cell sedimentation. The results of the resorcin test and of complement deviation are scarcely comparable. The first indicates in a general way the degree of toxic impregnation, the latter the capacity for defense. In some cases a combination of the two tests will be of interest.—*Réaction de Vernes et Tuberculose, L. Bernard, H. Bonnet and M. Lamy, Rev. d. l. Tuberc., October, 1929, x, 623.*—(*A. P.*)

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